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Slow publishing in the age of ‘fast-food’

Executive summary. Rapid publication seems like an obvious imperative for scientific debate in the digital era. Most, if not all, science publishers aim to shorten the process between first submission and final publication of articles. However, while minimizing editorial handling and post-acceptance processing certainly reduces the time between research being conducted and being read, a “fast-food” publication model may sacrifice quality in the editorial process. We encourage adoption of “slow publishing” for most research journals, where advancing towards higher quality – rather than towards a faster rate – of scientific debate is promoted as a central goal of the editorial and review process.

Keywords: editorial process, open peer review, reproducibility crisis, science quality, scientific debate

“[The Slow Movement] is a cultural revolution against the notion that faster is always better. The Slow philosophy is not about doing everything at a snail’s pace. It’s about seeking to do everything at the right speed. Savoring the hours and minutes rather than just counting them. Doing everything as well as possible, instead of as fast as possible. It’s about quality over quantity in everything from work to food to parenting.” From Carl Honoré (2004) *In Praise of Slow: How a Worldwide Movement is Challenging the Cult of Speed*.

The diversity and role of ‘debate’ in science

Debate is a central part of the scientific process. Researchers debate with peers about their most recent results or their new ideas. We debate constantly in person, at our offices and lab meetings, doing labwork and fieldwork, at lunch time, over a coffee or a beer, and of course during workshops and conferences. And the global nature of Science necessitates a large part of the scientific debate be done remotely, primarily by means of a to-and-fro in the scientific literature. The giants on whose shoulders our current research stands similarly debated through informal letters, which were followed by their formal articles and books. There is no doubt about the importance of this debate in, for example, the central role of Humboldt’s books and prolific correspondence for the development of modern ecology (and evolution) and other natural sciences (e.g., Wulf 2015, Keppel and Kreft 2019). Nor is there doubt about the value of the interchange of ideas in the letters between Wallace

and Darwin that led to the synthesis of the idea of natural selection (e.g., van Wyhe 2013).

Currently we continue to write books and exchange letters, usually in the form of e-mails, but most research is formally presented and discussed in journal articles, which constitute the primary mode of academic communication (Fitzgerald and Midiri 2013). Academic journals have been of critical importance for the development of scientific debate since their appearance in the late 17th Century¹ and the implementation of peer review that started five decades later². Indeed, a large part of the advancement of modern science has been made through publishing articles in peer-reviewed journals, particularly since the end of the Second World War (Shama 2014). But the landscape of communicating research has been changing rapidly during recent years. Novel digital venues such as blogs, posts in social media, twitter feeds, etcetera, allow dissemination of results and ideas worldwide within a few seconds. The capacity of digital media to disseminate rapidly is so powerful that, in fact, currently most researchers make their results public before they are finally published in a scientific journal (Thursby et al. 2018). However, the value of these new means of communication is essentially different from the value of peer-reviewed articles. The editorial and peer-review process helps authors select their main message carefully, refine its presentation, and seek the best supporting materials and visualizations, all to make sure that their message is fully and rightfully understood. This helps establish a reference point for the quality of the results and argumentations that are actually worth publishing and reading (and on which future research can stand), thus adding significant value that goes beyond the mere dissemination of raw research results. Consequently, most research areas

¹ The first regular academic journals composed of articles, *Journal des Savants* and *Philosophical Transactions of the Royal Society*, appeared in 1665 (Brown 1972).

² The introduction of peer review in academic publications dates back to 1731, when the Royal Society of Edinburgh published a collection of peer-reviewed medical articles (Shama 2014).

currently rely on peer-reviewed articles as the most important curated venue for disseminating scientific results and ideas.

Although many current conventions of the research article may be traced back to the 17th Century (Swales 1990, cf. Fitzgerald and Midiri 2013), the functioning and structure of scientific journals has changed dramatically. The landscape of publication models is currently more complex than ever before, providing a diversity of types of (digital) content and how these are distributed and accessed. We already discussed how open access is changing publishing in biogeography (Dawson et al. 2017a,b, McGill et al. 2018). It also is worth reflecting on how the digital era is changing the editorial and peer-review processes that happen behind the scenes of academic journals.

In the era of fast food, 1-click shopping, and almost instantaneous access to our preferred video or song, rapid online publication seems an obvious step forward to enrich scientific debate. Most, if not all, scientific publishers are making evident efforts to shorten the process between first submission and final publication of an article. Minimizing editorial handling and post-acceptance processing is a laudable aim, for it certainly reduces the time between new data and ideas being synthesized into a manuscript by the authors and those data and ideas finally being read by peers. However, we are increasingly concerned that a “fast-food” publication model may be developing in part by sacrificing the quality of the editorial process. Moreover, ‘fast publishing’ may play the role of facilitator, or even instigator, of an ultra-competitive research environment. Regardless of the nature of such a relationship between fast-publication and competition, it is clear that the general adoption of this model by young generations of researchers enhances the development of an increasingly unhealthy “publish or perish” mentality. Here we challenge the idea that shorter publication times are necessarily better, by focusing on the trade-off between the speed and the quality of the editorial review process (see Figure 1).

More haste

In the rush to publish, editorial processes are commonly misunderstood as filters that increase the difficulty of publishing good research in the top journals of each subject area. This perception is exacerbated by the increasing reliance on simplistic journal citation metrics that help funnel the globally increasing number of manuscript submissions toward a few top journals per discipline, plus some interdisciplinary ones. This saturates the editorial boards of these top journals, which reject most of the papers they receive, often after an initial screening by one or two editors rather than

after full peer-review. This is pragmatic for all: avoiding swamping limited handling editors and peer-reviewers with many times more manuscripts than already are under consideration, avoiding delays because it is increasingly difficult to find reviewers, and if done quickly then authors can resubmit with little prejudice in terms of time. Moreover, when based on insight into the fit with the journal, adequacy of methods, the importance of results, the soundness of arguments and/or the significance of ideas in the manuscript, this ‘editorial review’ is entirely fair and consistent with the principles of peer review. This defines the role of top journals within the wider process of scientific debate whether they are premier journals such as *Nature* or *Science*, or the top-tier journals of a particular discipline: they serve as showcases for disseminating the latest advances and some cutting-edge results⁵. It therefore makes some sense for these journals to consider rapid publication as part of their reputation⁶, though in haste they take on risk of publishing science that will not stand the test of time. They may also reject some ground-breaking research, such as the famous rejection of Enrico Fermi’s original paper on the theory of beta decay by *Nature* (see, e.g., Nanni 2018). Because such papers generate considerable attention, it is likely that flawed methods, wrong results, or misconduct will be debated and exposed publicly within a relatively short period of time.

For a small but significant proportion of submitted manuscripts (~20% in our experience; MN Dawson unpubl. data), however, the editorial rejection ends a

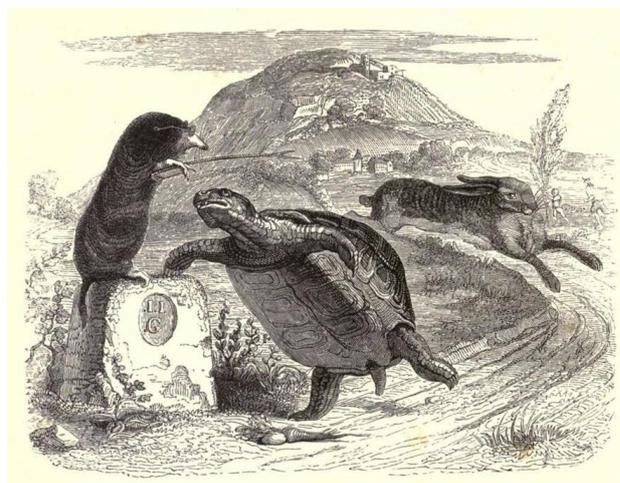


Figure 1. Does Aesop’s fable of “The Tortoise and the Hare”^{3,4} provide a compelling analogy for modern scientific publishing? The fable represents a group of idioms observing that rapidity is not always equal to advancement, for example: “More haste, less speed” and “The race is not always to the swift.”

³ <http://www.read.gov/aesop/025.html>

⁴ Image from https://en.wikipedia.2wiki/The_Tortoise_and_the_Hare%22/_1_%22/media/File:Grandville_tortoise.jpg

⁵ See, e.g., Rodgers 2015 for some examples of the long-term impact of *Nature* magazine.

⁶ For example, the Nature Research group includes median editorial times as an integral part of their journal metrics, along with Impact Factors. See https://www.nature.com/npg_/company_info/journal_metrics.html

process which could have improved the manuscripts and contributed to their publication. What happens with this cutting-edge research that did not make it into the top journals? And what happens with the good science that does not provide a major advance in its subject area? In general, these manuscripts will cascade down to second or third tier journals where, increasingly, they receive only cursory technical review. This raises a serious problem: they may receive less rigorous pre-publication review and receive less immediate post-publication critique than papers published in top journals or caught up in the storm's eye of a public debate; they will be less quickly exposed to science's inherent error-correcting process. There is a case to be made, then, that the reviews and discussions held during the editorial process should improve most articles and that this becomes increasingly important the lower the profile of the journal. However, this does not excuse top journals from developing strategies to improve the reliability of the papers they publish (see Casadevall 2019).

Importantly, the growth of scientific knowledge is not only based on frontier science. The foundations of scientific advance are built from the accumulation and consolidation of knowledge within the research frontiers of each discipline. Applying the rapid publication model to such cumulative knowledge jeopardizes its quality. Only publishers profit from publishing more papers and faster, for it allows them to develop strong balance sheets. Besides them, very few actors benefit from a model where the number of articles and the speed at which they are published outranks their quality and significance for both the consolidation of knowledge and the advance of science. Yet, the rapid publication model seems headed in this very direction. The current publication landscape already shows the effects of the pre-eminence of numbers in publication strategies and research evaluations. Jointly, the haste to publish and misunderstanding of editorial processes has fostered not only the rise of journals with solely technical review but also journals with no review and those that are predatory. The volume of science published in these venues has increased rapidly, and some even carry prestigious names, but the peer review process and improvements they can offer are absent or minimal. The 'fast food' paper provides instant gratification, but its long-term nutritional value for the growth of knowledge is unclear. Moreover, the desire for speed in publishing precipitates a need to read with speed, further shallowing our engagement with the literature.

The right speed

A commonly forgotten characteristic of the editorial process in peer-reviewed journals is that it is one of the best opportunities for deliberate scientific debate. The ultimate goal of editors and reviewers in a truly constructive peer-review process is to help authors improve their work as much as possible, rather than filtering the papers that are finally published

(Dawson et al. 2014). Under this point of view, reviews provide a lot of room for discussing not only the methods, but also the ideas and implications of the results that were in the original manuscript, and its successive revisions. This may conflict with the speed of the review process, for reviewers need time to read the paper, think about it, and write a critique that enhances discussion with the authors. Editors also need to synthesize reviews and any issues that appear during their own reading of the manuscript into advice that directs the debate and guides authors through the revisions that are needed to improve the overall quality of the work or, at least, reach the minimum publication standards. This takes time. Time to reflect about the research, and to reach a calm moment in the often hectic weeks of academics. This is in direct conflict with the current trend to request shorter and shorter times to review papers, because of the time needed to read the manuscript, let it resonate in the back of our minds for a few days while we digest it, and free one large time slot to write down the review while re-reading the paper.

Here we argue that the value of the scientific debate held during the revisions is maximal for research published outside top-tier journals, and therefore that the quality of such debate should not be sacrificed to speed up the editorial process. It thus makes little sense to pursue shorter review times if that could potentially push reviewers to rush their revisions. Rather, we call for maintaining a "slow publishing" model for all regular scientific journals outside of the few most prestigious titles. This follows the "slow science" manifesto⁷, which calls for reshaping the way research is done in a way that scientists actually have time to think (see also Alleva 2006, Lutz 2012, Halme et al. 2012).

In the same way the "slow food" movement seeks to use regional products and recipes to improve feeding habits, the slow publishing model should profit from the long-term tradition of epistolary scientific debate and rely on specialists –both editors and reviewers– that take time to debate efficiently with the authors about the research they conducted. It could be argued that this can slow down the pace of the editorial process. But alike the Tortoise and the Hare fable, if done properly a slow, thorough revision can reach the goal sooner: reducing the number of rounds of review, because the authors' original submission and their response are also 'slow' and the editor is able to make a decision to accept on the original or first-revision stage. This kind of approach ensures that not only does novel knowledge meet standards of quality needed for publication, but most importantly it is enriched: research is improved by in-depth scientific discussion with peers outside of the group that conducted it. In other words, the new scientific knowledge will be properly debated before it reaches its final form as an article. Moreover, this 'slow' approach taps the brakes on the unhealthy acceleration of "publish or perish" which is being promoted by those journals

⁷ The slow science manifesto was initially proposed in a 2010 by a group of academics (self-called the Slow Science Academy) in Berlin (2010). See <http://slow-science.org/>.

that purport to support us as scientists by publishing using minimal (or no) review criteria. In this, 'slow publishing' is among the most under-valued potential solutions to 'work-life-balance' that we supposedly value (see also Nobeli 2018).

None of these arguments is new. In fact, they should all be widely known. But they are worth remembering at a time when journals commonly ask reviewers to return reviews within two weeks of the invitation. The time of reviewers (and associate editors) is a luxury that, in most cases, journals get for free. It is *pro bono* work that researchers do to support the global infrastructure of communication and debate that the publication system effectively provides to science. So it is the responsibility of publishers and chief editors to value that service by allowing time enough for constructive reviews despite our usually full academic schedules. For most academics this probably means one-month rather than 2-week review assignments, particularly if they review more than ten papers per year, as many of us do, and we take the time required for the quality reviews that the slow publishing model can provide.

This slow publishing model also has implications for us authors. We should bear in mind that the review process is an opportunity for improving our research, rather than a painstaking toll to pay to get a paper published. The luxury of reviewers and editors' time also applies here; it is the responsibility of us as authors to first make sure that our articles are prepared appropriately for submission to the journal and for reading by our peers, and then to make the most of the work of constructive reviewers and editors⁸ to improve the research. This implies taking all editorial and reviewer suggestions into full consideration and reflecting on any disagreements with calm and positive spirit, to then perform new or additional analyses when preferable, modify our original texts to accommodate the criticisms that are fair and sound, or use our reply letters to evince in a civil way those critiques that we consider unsound or unfair. We note that quite often disagreements are due to obscure language in the original text, rather than to the lack of (intellectual) capacity of the reviewers or editors to understand the conceptual arguments in manuscripts. It is not always easy to explain our research arguments and ideas in a clear way, let alone understand the ideas of others when they are not clearly written. Note that the same applies to reviewers and editors.

The slow publishing model will affect the time needed for the editorial processes, but this is only a portion of the time. Efficient internal processes

handled by the journal's editorial team plus four weeks for review assignments, allowing for occasional unavoidable delays, means a total of 2–3 months for a standard round of the editorial process (Figure 2). If authors are thorough in addressing and debating reviewer's comments, a process with two rounds of review will take less than six months plus the time taken by the authors (see Figure 2). Not a lot of time if we consider that during this time at least two reviewers and an editor have read two or three versions of the manuscript and debated with the authors about it. In fact, the single major time-savings could be in quicker and more complete responses by authors that would enable an editorial decision on first resubmission, instead of another round of peer-review, shaving 1-2 months off the process. Final publication can be sped up by an efficient production process after acceptance. Under a conservative scenario, the final version of the manuscript could be copyedited and a pre-print version published in the online early section of the journal less than one month after acceptance (Figure 2) and a typeset galley less than a month later.

Innovations in publishing side-step some of these issues. For example, systems of peer review of pre-prints, such as those promoted by *Peer Community In*⁹ (*PCI*), unite public sharing of manuscripts with peer review. Here, authors who deposit an unpublished pre-print on an open online archive can submit it to a *PCI* for evaluation and recommendation. A recommender¹⁰ of the corresponding *PCI* can then decide to take it in charge and, after one or several rounds of peer-reviews, to reject or recommend it. In this latter case, the reviews, the authors' answers, the successive versions of the manuscripts and the final reasoned recommendations by the recommender are published online on the corresponding *PCI* website. These recommendations (and the whole information of the process) can be used by the editors of regular journals – and even of top journals¹¹ – to make their editorial decisions, sometimes without recourse to additional reviews.

Likewise, editorial processes that re-use reviews minimize the accumulation of unrelated reviews of the same manuscript in different journals, and reduce saturation of the peer review system. In such *fast-track* submissions, authors account for the reviews that led to the rejection of their manuscript in a top journal, and send the revised manuscript together with a detailed response to these reviews to another journal. This way the editors of this second journal can take into account the revisions already done to former versions of the manuscript, giving additional value to reviews

8 It would be naïve to deny that some reviewers provide thin reviews, do not do it in a constructive way, jeopardize the debate by using authority rather than reasoning, or are even demeaning. Editors should handle these reviews by pointing the authors to the arguments that are truly meaningful, relevant or useful... which of course takes time.

9 <https://peercommunityin.org/>

10 *PCI* recommenders are highly competent researchers appointed by a Managing Board. Their role is similar to that of a journal editor (finding reviewers, obtaining peer reviews, making editorial decisions based on these reviews), and they may reject or recommend the preprints they handle after one or several rounds of reviews. If a recommender eventually decides to recommend an article, s/he writes a "recommendation" that has its own DOI and is published on the website of the corresponding *PCI*.

11 <https://peercommunityin.org/pci-friendly-journals/>

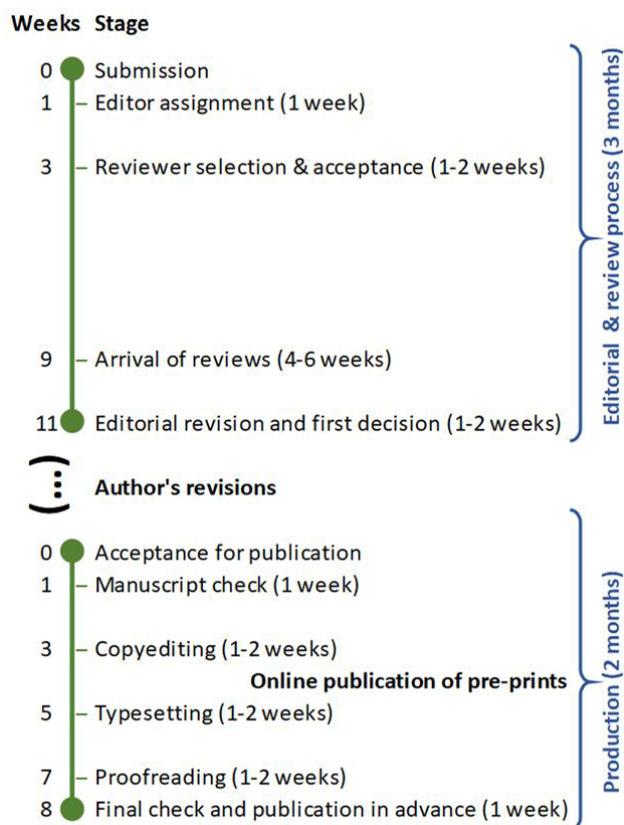


Figure 2. Approximate times for all the stages of an editorial process following a slow publishing model, where reviewers and editors are given enough time to constructively critique a manuscript and contribute to the scientific debate. Note that, if the rules of slow publishing are followed, and good-quality reviews and revisions are sought, ideally there may be just one round of author revisions, thus avoiding repeated cycles of the editorial and review process. Times are deliberately given in weeks rather than days, to highlight that the editorial tasks need to be fitted into the work schedules of authors, reviewers, editors, copyeditors and typesetters.

and editorial work that would otherwise be lost. This option is being institutionalized by several publishing companies, who ‘cascade’ manuscripts rejected from top journals to regular open access journals that follow a pay-to-publish model. This saves time for authors and reviewers, but many times at the cost of a higher Article Processing Charge than the journal to which the manuscript was initially submitted.

Reaching the goal: The tortoise first?

Slow publishing requires that all who are involved meet a number of responsibilities, the benefits outweigh the costs (see Box 1), and have the potential

to transform the research community into a healthier and more productive work environment. Therefore, we believe that most good, responsible research journals should embrace a slow publishing model where quality is promoted over speed as the main goal of the editorial process. For sure, we do not want to return to the days when the first decision would take six or more months, but there is value in allowing time for a steady effort that ultimately advances science farther. The desire of top-tier (and bottom-tier) journals to seek faster review times does not have to extend to other periodicals. This way, the burden that currently falls on researchers who regularly accept papers for review can be lightened. And arguably, the commonly invoked rule of thumb of three reviews per each paper you publish as main (first or senior) author plus one for each couple of papers where you had a minor role (see, e.g., Fox & Petchey 2010) would be enough to maintain a healthy peer-review system that allows constructive scientific debate that leads to improve the overall quality of published research.

In adopting ‘slow publishing’, the time devoted to reviewing manuscripts meaningfully—as either editors or, especially, reviewers—should be taken into account during research evaluations. Editors are acknowledged by the public disclosure of their roles in the editorial boards of the journals. Reviewers can be recognized by peer-evaluation systems such as *PCI* (see above) or *Peerage of Science*¹², general registries of peer reviews such as *publons*¹³, or by periodical awards recognizing the best reviewers and editors that worked for each journal (as in, e.g., Dornelas et al. 2018). Actions and recognitions of this kind tacitly recognize the trade-off between producing one’s own work versus reviewing that of others, and that both contribute to scientific progress. Evaluation committees thus are a key actor in moving towards slow publishing. For researchers to focus on quality rather than numbers of publications, committees must focus on quality as their key evaluation criterion. In some institutions, this may be driven bottom-up by a strong faculty senate; in others it may need top-down policy by the institutional head. Both can favor job applicants and/or research grants that raise the bar of the whole institutional profile, while helping release pressure on publishing rate. “Slow evaluation” systems already exist where, for example, applicants emphasize key achievements in a part of their record and its relevance to the application at hand. Evaluation committee members then can conduct in-depth assessments of these achievements rather than using general proxies like the journal’s Impact Factor, which are still widely used despite being widely discouraged (e.g., by DORA¹⁴). Such change in evaluations with more meaningful targets and easier management procedures will increase many scientists’ time for doing good-quality research.

¹² <https://www.peerageofscience.org/>

¹³ <https://publons.com/>

¹⁴ The widely accepted San Francisco Declaration on Research Assessment (DORA; <https://sfedora.org/>) highlighted already in 2012 “the need to improve the ways in which the outputs of scholarly research are evaluated”.

Box 1. Responsibilities and benefits for all roles involved in the development of a slow publishing model. This model promotes a higher quality of science outputs and a diminution of the likelihood of publishing results that are either flawed or based on unethical practices. ‘Managers’ include all research managers and evaluation committees; ‘Science’ represents the scientific community and the general advancement of knowledge.

	Responsibilities	Benefits
Authors	<ul style="list-style-type: none"> • Prepare good and well-finished manuscripts • Consider reviewer and editor's advice seriously • Be thorough in accounting for and/or discussing such advice • Cite other papers based on priority and quality^a 	<ul style="list-style-type: none"> • More useful and thoughtful feedback during peer review • Publishing better, more citable, articles^b • Tracking less extensive bibliographies • Decreased level of competition; escape from the "publish-or-perish" mentality • More time for research, healthier work environment, better quality of life
Reviewers	<ul style="list-style-type: none"> • Examine manuscripts thoroughly • Apply fair, but nevertheless high quality standards • Provide well-thought, constructive reviews 	<ul style="list-style-type: none"> • More time for reviewing a manuscript • Receive fewer review requests • Review fewer versions of a manuscript • More time for research, healthier work environment, better quality of life
Editors	<ul style="list-style-type: none"> • Conduct initial critical reading of the manuscripts handled • Take decisions based on reading replies to reviews and resubmitted manuscripts, rather than sending for additional rounds of review^c 	<ul style="list-style-type: none"> • Receive fewer manuscripts to edit • Submitted manuscripts become higher quality and better finalized • Handle each manuscript fewer times • More time for research, healthier work environment, better quality of life
Publishers	<ul style="list-style-type: none"> • Focus on the quality of the editorial process rather than on its speed • Increase the requested times for reviewing and taking decisions • Explore new platforms and technological advances to improve the peer review process and publishing 	<ul style="list-style-type: none"> • Save copyediting and typesetting costs as accepted manuscripts are polished • Eventually, reduction in overall costs if the publication model flips from large numbers to fewer but better articles • Increase in prestige and recognition by the research community
Managers	<ul style="list-style-type: none"> • Assess quality of research instead of raw numbers • Avoid using simplistic citation-based indices as a direct proxy of quality • Evaluate selected papers and grant results 	<ul style="list-style-type: none"> • Higher ability to detect potentially ground-breaking research and/or excellent researchers • Enhanced productivity in terms of scientific advance and innovation^d
Science		<ul style="list-style-type: none"> • Enhanced scientific discussion through a well-curated editorial process • Lower likelihood of flawed publications^e • Higher engagement of the research community in the peer review process • Increased quality of published research • Reduce overall publication volume to fewer, but more important, articles

^a Papers should be cited based on priority and/or research quality (rather than on how recent they are or the impact factor of the journal they were published in) to incentivize other authors to invest in high-quality publications.

^b Better articles are more likely to have a significant impact in their respective subject areas or disciplines, and therefore it is more likely that they become well-cited.

^c This can be done only when the editor has enough expertise to judge the review outcomes. Additional reviews may be needed when the editor cannot fully evaluate the quality and soundness of the technical and/or conceptual changes made to the paper.

^d Rather than in terms of numbers of items.

^e The publication of articles containing flawed research can undermine the scientific enterprise, jeopardizing public confidence in science¹⁵

¹⁵ See, for example, <https://www.theguardian.com/science/2018/aug/27/attempt-to-replicate-major-social-scientific-findings-of-past-decade-fails>

Importantly, our individual decisions, in the collective, will decide the success of a slow publishing model, or accelerate the rat race. Implementation of the slow publishing model is the responsibility of us as editors and publishers. We as authors also need to invest time and effort –before submitting and after review– to produce quality manuscripts that lighten the load on reviewers (i.e. you) and editors who in turn can provide higher-quality review. Here it is important to note that the transition to a slow publishing model must be cross-generational. The competitive environment of modern science requires a solid publication record, which means more established researchers often have greater capacity to effect change. For young researchers, there is a more delicate balance between publishing more versus publishing better science, but the discussion around evaluations has shifted toward quality in the past decade. The lives of all scientists and the overall quality of scientific products would benefit greatly by disempowering the “publish [prolifically] or perish” mentality, and the youngest will have the greatest time to benefit, but the burden lies primarily with more senior researchers –who have capital to expend – to drive change in the frenetic publication system. Perhaps by publishing less, we might all make more time to savour and enjoy writing, reading and reflecting about novel research.

Besides the important goal of improving the experience for all involved, slow publishing can also improve the overall quality and long-term significance of the papers that are finally published. This quality is not measured by the immediacy of the journal’s Impact Factor. It is rather the long-term achievement of a discipline when most of its papers are solidly grounded in healthy scientific debate. This is how the works of Humboldt, de Candolle, Lyell, Wallace, Darwin, Wegener and many other late and living Giants have taken the study of the Grand Subject (see, e.g., Dawson et al. 2016, Lomolino 2018) of the spatial and temporal distribution of organisms to its current degree of development. The adoption of slow publishing practices by, at least, some senior researchers may create a virtuous circle that provides the impetus necessary to promote a shift from current publication paradigm to one that promotes excellence and qualitative advancement over short-term visibility and quantitative impact. It is still a good way for the current generations of ecologists, evolutionary biologists and biogeographers to establish the foundations for 22nd Century Biogeography.

“But you’re mistaking speed, for getting what you need” Aimee Mann, *Driving Sideways*, from *Magnolia: Music from the Motion Picture* (1999)

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References

- Alleva, L. (2006) Taking time to savour the rewards of slow science. *Nature*, 443, 271.
- Brown, H. (1972) History and the learned journal. *Journal of the History of Ideas*, 33, 365–378.
- Casadevall, A. (2019) Huge misconduct fine is a reminder to reward rigour. *Nature*, 568, 7.
- Dawson, M.N., Field, R. & Hortal, J. (2014) Guides, not gatekeepers. *Frontiers of Biogeography*, 6, 108–110.
- Dawson, M.N., Axmacher, J.C., Beierkuhnlein, C., Blois, J.L., Bradley, B.A., Cord, A.F., Dengler, J., He, K.S., Heaney, L.R., Jansson, R., Mahecha, M.D., Myers, C., Nogués-Bravo, D., Papadopoulou, A., Reu, B., Rodríguez-Sánchez, F., Steinbauer, M.J., Stigall, A., Tuanmu, M.-N. & Gavin, D.G. (2016) A second horizon scan of biogeography: Golden Ages, Midas touches, and the Red Queen. *Frontiers of Biogeography*, 8, e29770.
- Dawson, M.N., Field, R., Hortal, J. & Stigall, A.L. (2017a) Introduction, Establishment, Invasion, Accommodation: innovation and disruption in biogeographic publishing. *Frontiers of Biogeography*, 9, e34426.
- Dawson, M.N., Stigall, A.L. & Hortal, J. (2017b) How the landscape of publishing is changing biogeography. *Frontiers of Biogeography*, 9, e35718.

- Dornelas, M., Field, R. & McGill, B.J. (2018) In gratitude for altruistic peer reviewers - Reviewer and Associate Editor awards 2017. *Global Ecology and Biogeography*, 27, 1.
- Fitzgerald, W. & Midiri, N. (2013) But is it really research?: Undergraduate anxieties in the Humanities. *Perspectives on Undergraduate Research & Mentoring*, 2.2, available at <https://blogs.elon.edu/purm/2013/04/12/>
- Fox, J. & Petchey, O.L. (2010) Pubcreds: Fixing the Peer Review Process by “Privatizing” the Reviewer Commons. *Bulletin of the Ecological Society of America*, 91, 325–333.
- Halme, P., Komonen, A., & Huitu, O. (2012) Solutions to replace quantity with quality in science. *Trends in ecology & evolution*, 27, 586.
- Keppel, G. & Kreft, H. (2019) Integration and synthesis of quantitative data: Alexander von Humboldt’s renewed relevance in modern biogeography and ecology. *Frontiers of Biogeography*, 11, e43187.
- Lomolino, M.V. (2018) On Teaching “... that grand subject, ...”. *Frontiers of Biogeography*, 10, e37812.
- Lutz, J. F. (2012) Slow science. *Nature Chemistry*, 4, 588.
- McGill, B., Araújo, M., Franklin, J., Linder, H.P. & Dawson, M.N. (2018) Writing the future of biogeography. *Frontiers of Biogeography*, 10, e41964.
- Nanni, L. (2018) Fermi theory of beta decay: A first attempt at electroweak unification. arXiv, 1803.07147v2.
- Nobeli, I. (2018) In praise of slow. *Science*, 359, 602.
- Rodgers, P. (2015) Nature’s ups and downs. *Physics World*, December 2015. Available at <https://physicsworld.com/a/natures-ups-and-downs/>
- Shema, H. (2014) The birth of modern peer review. *Scientific American Information Culture* blog, April 2014. Available at <https://blogs.scientificamerican.com/information-culture/the-birth-of-modern-peer-review/>
- Swales, J. (1990) *Genre Analysis: English in Academic and Research Settings*. Cambridge University Press, Cambridge.
- Thursby, J.G., Haeussler, C., Thursby, M.C. & Jiang, L. (2018) Prepublication disclosure of scientific results: Norms, competition, and commercial orientation. *Science Advances*, 4, eaar2133.
- Wulf, A. (2015) *The Invention of Nature: Alexander von Humboldt’s New World*. Knopf, New York.
- van Wyhe, J. (2013) *Dispelling the Darkness: Voyage in the Malay Archipelago and the Discovery of Evolution by Wallace and Darwin*. World Scientific Publishing, Singapur.